Supplementary Information

Boosting N_2 photoreduction by ZnO@HCu$_x$S composite with high activity and easy recovery grown on copper mesh

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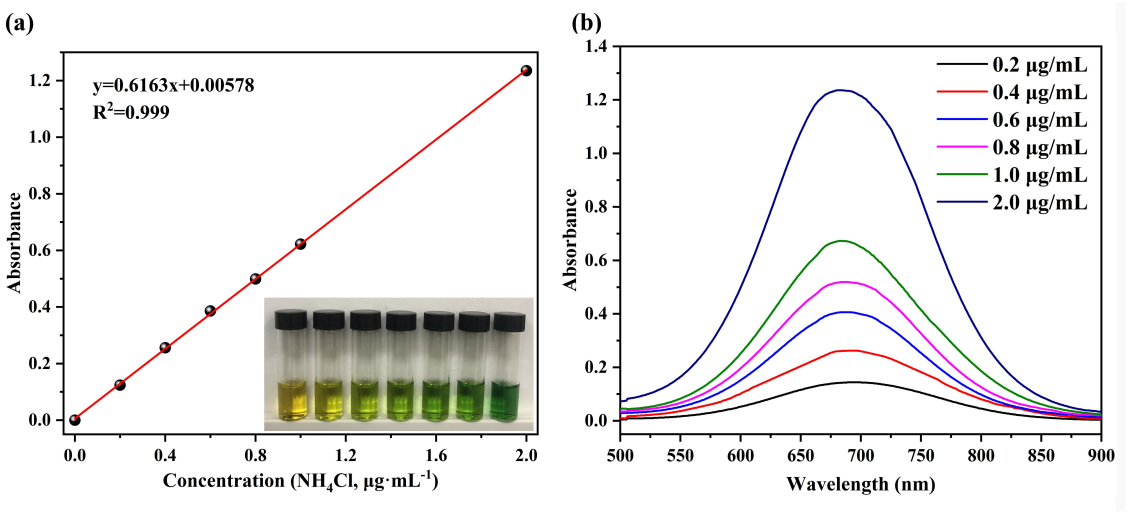

Fig. S1. (a) The standard curve and (b) absorption spectra of ammonium ion solution determined by indophenol blue method.

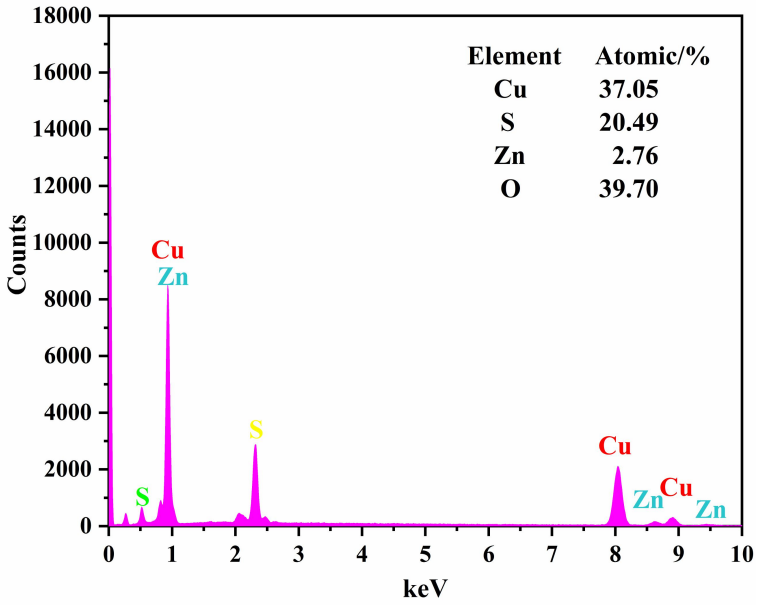

Fig. S2. EDS analysis of the ZnO@HCu$_x$S-cm sample.

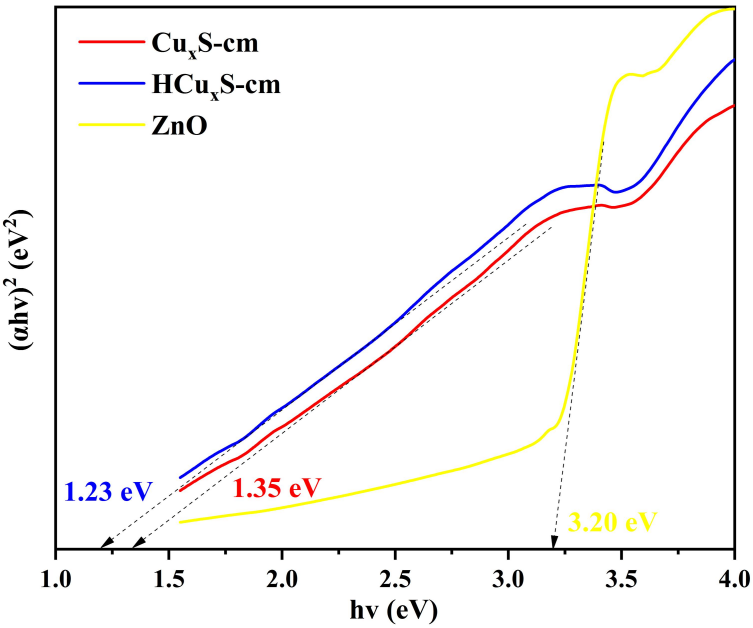

Fig. S3. The curves of $(\alpha h\nu)^2$ vs. hν of Cu_xS-cm, HCu_xS-cm and ZnO-cm.

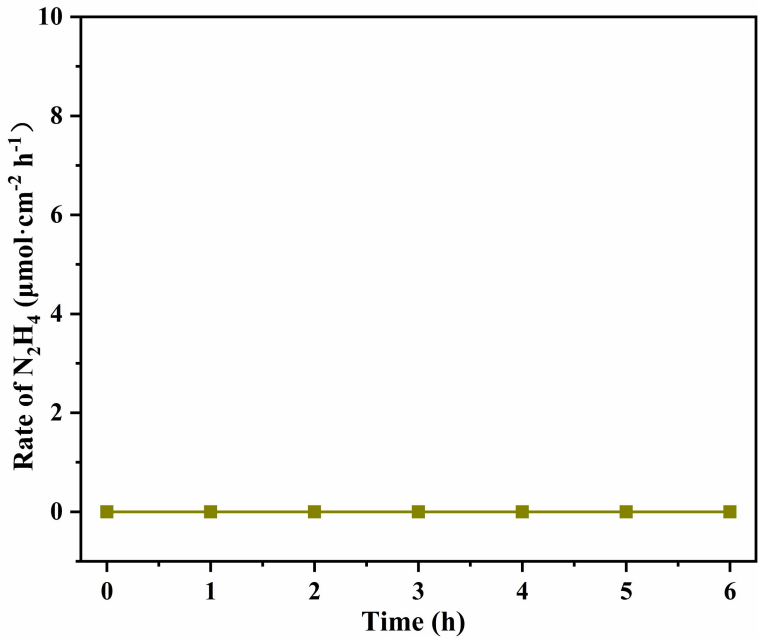

Fig. S4. The amount of N_2H_4 produced on ZnO@HCu$_x$S-cm.

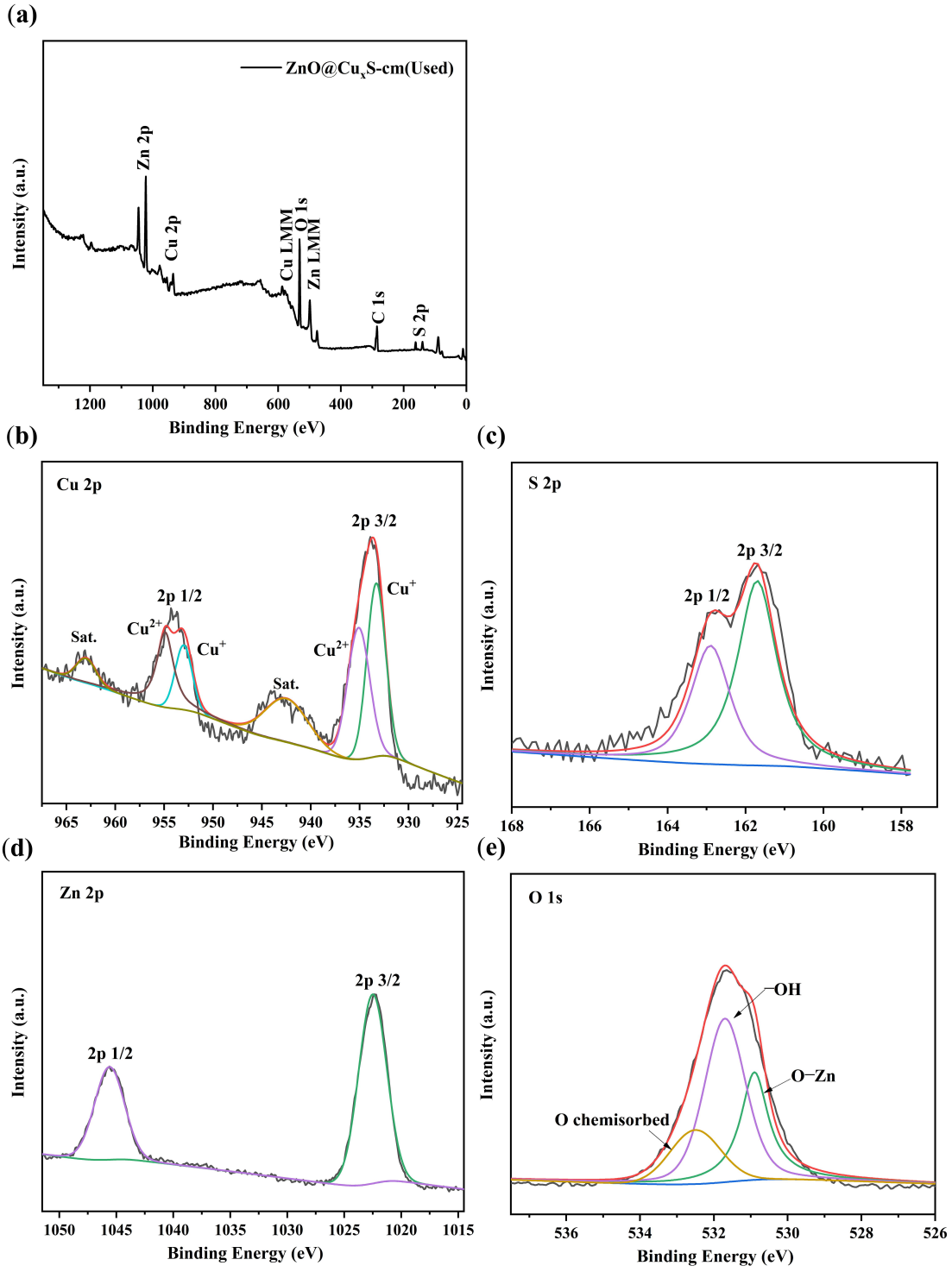

Fig. S5. (a) XPS survey spectrum and high resolution spectra of (b) Cu 2p, (c) S 2p, (d) Zn 2p, and (e) O 1s of ZnO@HCu$_x$S-cm (used).

Table S1. The fitting results for EIS Nyquist curves of samples.

Samples	R_s ($\Omega \cdot cm^{-2}$)	$R_{ct,1}$ ($\Omega \cdot cm^{-2}$)	CPE_1-T	CPE_1-P	$R_{ct,2}$ ($\Omega \cdot cm^{-2}$)	CPE_2-T	CPE_2-P
Cu_2O-cm	0.752	25.79	6.85E-5	0.610	—	—	—
Cu_xS-cm	0.440	9.58	3.92E-3	0.333	—	—	—
HCu_xS-cm	1.07	7.036	1.22E-8	1.189	8.156	1.08E-3	0.729
ZnO@HCu_xS-cm	1.123	5.617	9.02E-9	1.218	2.897	6.62E-5	0.996

Table S2. Comparison of NRR performance with other photocatalysts.

Photocatalysts	Reactants	Light source	NH_3 yield ($\mu mol \cdot g_{(cat)}^{-1} h^{-1}$)	Ref.
ZnO/Bi_2O_4	N_2, 10 vol% methanol solution	300 W Xe lamp (> 420 nm)	220	[S1]
MoS_2/C-ZnO	N_2, 5 vol% ethanol solution	300 W Xe lamp (> 420 nm)	245.7	[S2]
$ZnO/ZnSnO_3$/Carbon Dots	N_2, ethanol solution	500 W Xe lamp	4600	[S3]
WO_3/B-doped g-C_3N_4	N_2, 5 vol% methanol solution	300 W Xe lamp (> 420 nm)	450.94	[S4]
NiP_x-3DOM H_xWO_{3-y}	N_2, 4 vol% methanol solution	300 W Xe lamp	34	[S5]
Zn-MIL-88A	Ultra-high purity N_2, distilled water	300 W Xe lamp	300	[S6]
Ti_3C_2/g-C_3N_4	Ultra-high purity N_2, 10 vol% methanol solution	300 W Xe lamp (> 420 nm)	601	[S7]
CdS/CNS	N_2, distilled water	350 W Xe lamp (> 400 nm)	327	[S8]
$BiVO_4$	High purity N_2, ultra pure water	300 W Xe lamp (> 400 nm)	103.4	[S9]
$Bi_2O_2CO_3$	High purity N_2, 1 mM Na_2SO_3 solution	300 W Xe lamp (> 420 nm)	1178	[S10]
ZnO@HCu_xS-cm	N_2, distilled water	350 W Xe lamp (> 420 nm)	894 μmol $g_{(cat)}^{-1}$ h^{-1} (89.4 μmol cm^{-2} h^{-1})	This work

Supplementary References

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